

## **REMARKS**

In view of the above amendments and the following remarks, reconsideration of the rejections and further examination are requested. Upon entry of this amendment, claims 20, 26, 27, 31 and 33 are amended, claim 38 is added, and claim 32 is cancelled, leaving claims 20, 24-27, 31, 33 and 38 pending with claim 20 being independent. No new matter has been added.

The amendments to the claims are supported at least by paragraphs [0110] and [0111] of the publication of this application.

### ***Rejections Under 35 U.S.C. §103(a)***

Claims 20, 24-27 and 33 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lahaug (U.S. 6,338,938) in view of Mimura et al. (U.S. 7,022,616) and McReynolds (U.S. 6,191,043).

Applicants submit that the claims as now pending are allowable over the cited prior art. Specifically, amended independent claim 20 recites a plasma etching method comprising performing a first etching including introducing a first etching gas into the treatment chamber, the first etching gas including sulfur hexafluoride (SF<sub>6</sub>) gas, helium (He) gas, and oxygen (O<sub>2</sub>) gas, but not including polymer forming gas, energizing the first etching gas into a plasma state, and etching silicon of the SOI substrate until a stopper layer in the SOI substrate is exposed, so as to form a trench, performing a second etching including introducing a second etching gas into the treatment chamber after the first etching, the second etching gas including SF<sub>6</sub> gas, He gas, and polymer forming gas, but not including O<sub>2</sub> gas, and energizing the second etching gas into a plasma state by applying electricity to the second etching gas, the electricity having a frequency that is equal to or more than 27 MHz, and etching silicon of the trench in the SOI substrate.

The above recited method enables the first process to form a trench with a high aspect ratio, and preventing side etching from occurring in the trench. Moreover, claim 20 is now directed to a method that includes performing first and second etchings using first and second etching gases, respectively, which subject matter was previously generally recited in dependent claim 32. Therefore, claim 20 is directed to a plasma etching method that is capable of protecting the trench wall by the polymer forming gas, preventing a notch from forming.

The cited prior art fails to disclose or render obvious such a method. In particular, as recognized by the Examiner, Lahaug fails to disclose a second etching step. *See* the March 30,

2010 Office Action, pg. 9 (i.e., the previous rejection of dependent claim 32). For this element, the Examiner relies on McReynolds, stating that McReynolds teaches two gases that accomplish an equivalent function as far as etching silicon. *See id.* Applicants submit that even assuming that the Examiner's position is correct, McReynolds (and all other cited prior art) fails to disclose first etching, including etching silicon of an SOI substrate until a stopper layer in the SOI substrate is exposed, so as to form a trench, and second etching, including introducing a second etching gas into a treatment chamber after the first etching, the second etching gas including SF<sub>6</sub> gas, He gas, and polymer forming gas, but not including O<sub>2</sub> gas, as required by independent claim 20 of the present application.

Moreover, there is no reasoning in the prior art to modify Lahaug, Mimura, and/or McReynolds such that the combination thereof would have rendered independent claim 20 obvious. Therefore, Applicants submit that independent claim 20 and its dependent claims are allowable over the cited prior art.

Claim 31 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lahaug in view of Mimura and McReynolds, and further in view of Kholodenko et al. (U.S. 2003/0033979). Applicants submit that since this claim is dependent from independent claim 20 and since Kholodenko fails to overcome the deficiencies discussed above, claim 31 is allowable for the reasons set forth above.

Claim 32 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Lahaug in view of Mimura and McReynolds, and further in view of Okumura (U.S. 2003/0034542).

This rejection is moot since claim 32 has been cancelled.

### ***Conclusion***

In view of the foregoing amendments and remarks, all of the claims now pending in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Should the Examiner believe there are any remaining issues that must be resolved before this application can be allowed, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Mitsuhiro OKUNE et al.

/Jeffrey J. Howell/

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